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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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WOOD, HERRON & EVANS, LLP
2700 CAREW TOWER
441 VINE STREET
CINCINNATI, OH 45202

EXAMINER	
DAGOSTA, STEPHEN M	

ART UNIT	PAPER NUMBER
2683	

DATE MAILED: 08/04/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/928,865	JUDD ET AL.	
	Examiner	Art Unit	
	Stephen M. D'Agosta	2683	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 July 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2,4-24,34-43 and 55* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☐ Claim(s) *1-2, 4-24, 34-43 and 55* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

Applicant's arguments with respect to claims 1-3, 5-24, 34-41, 43 and 55 have been considered but are moot in view of the new ground(s) of rejection.

A more favorable outcome may occur if the applicant were to amend as follows:

1. Claim 1 + (claim 2 or 5) + claim 14 + claim 15 (ie. 1/2/14/15 or 1/5/14/15)
2. Claim 16 + (claim 18 or 22) + claim 23 + claim 24
3. Claim 34 + claim 36 + claim 40 + claim 41

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-3, 5-7, 9-13, 16-20, 22, 24, 34-39, 42, and 55 rejected under 35 U.S.C. 103(a) as being unpatentable over Gammon US 5,781,865 and further in view of Feuerstein et al. US 6,055,230 (hereafter Gammon and Feuerstein).

As per **claim 1,** Gammon teaches a system for sharing a cellular tower among multiple service providers (title) comprising;

an antenna having an array of elements operable to define multiple, individual beams for signals of the at least two individual service providers in a common analog RF communication frequency band (figure 7 shows Providers sharing antennas/beams and figures 17-19 show common analog frequency bands which require band-pass filtering (BPF) for separation);

converter circuitry to convert the antenna signals associated with the beams between the common RF communication frequency band (figures 17-19 show BPF's);

but is silent on

a common digital band representing the signals of the at least two service providers

circuitry for duplicating the common digital IF band;

digital filtering circuitry for processing the duplicated digital band and defining individual portions of the respective duplicated digital bands, such that a separate band portion is defined for signals of each of the at least two individual service providers,

signal processing circuitry for each of the at least two service providers, the

signal processing circuitry operable to process channel signals associated with the individual digital IF band portions defined for the individual service providers and to simultaneously drive the antenna to define at least one individual beam for each individual service provider.

Feuerstein teaches embedded digital beam switching (title) for a multi-beam antenna that uses A/D and D/A devices to convert from an analog signal to a digital signal between "locations" (ie. between sites, hardware, etc. – see Abstract too). One skilled in the art realizes that the converter, filtering and signal processing circuitry is inherent since conversion from digital to RF Cellular inherently requires a D-to-A (and A-to-D) conversion and the associated converter/filtering/signal processing hardware that goes along with said D-to-A conversion. The examiner puts forth that this "circuitry" can be located virtually anywhere in the signal path of and even "behind" the input/outputs shown. Further, Feuerstein teaches use of a multi-beam antenna and selection of the best beams (abstract, figures 1-3 and C2, L33-67) along with converting, filtering and signal processing C4, L30-67).

With further regard to claim 16, Gammon teaches a tower (eg. antenna structure) [see abstract and figure 16 shows antennas) **but is silent on** sectors. Feuerstein teaches multiple beams/beam switching (title, abstract) which is well known to be used in sectorized antenna systems (refer to Reudink, not cited, see figures 1a, 1b, 2 and C1, L35-67).

With further regard to claim 55, Gammon inherently requires used of A/D conversion in order to connect to the MSC/PSTN via digital communication links (eg. T1, etc.). As noted above, Feuerstein discloses this same hardware as well.

It would have been obvious to one of ordinary skill in the art at the time of applicant's invention to modify Gammon, such that the antenna has an array of elements operable to define multiple individual beams for signals in common communication frequency band(s), to provide means for using and selecting the best beams.

As per **claim 2**, Gammon teaches claim 1 **but is silent on** wherein the converter circuitry includes frequency converter circuitry to convert the antenna signals between the common analog frequencies of the communication frequency band and common intermediate frequencies for the band and;

Digital converter circuitry to convert the signals between the intermediate frequencies and a common digital IF band.

Gammon does teach using BPF's to filter between the providers' signals (see figures 17-19).

Feuerstein teaches conversion from RF to intermediate frequency and A/D or D/A conversion (C4, L30-47).

It would have been obvious to one of ordinary skill in the art at the time of applicant's invention to modify Gammon, such that frequencies are converted from analog to digital, to provide means to convert from digital links between the PSTN-to-BTS to RF links for BTS-to-mobile user.

As per **claims 3 and 17**, Gammon teaches claim 1/16 **but is silent on** wherein the signal processing circuitry defines multiple individual beams for each individual service provider.

Feuerstein teaches use of a multi-beam antenna and selection of the best beams (abstract, figures 1-3 and C2, L33-67). One skilled would utilize Feurstein's ability to use multiple beams with Ke's ability to support multiple service providers.

It would have been obvious to one of ordinary skill in the art at the time of applicant's invention to modify Gammon, such that the signal processing circuitry defines multiple individual beams for each individual service provider, to provide individual beams for each provider and selection of the best beam to support communications.

As per **claims 5, 18 and 36**, Gammon teaches claim 1/16/34 **but is silent on** wherein said antenna comprises an array of elements arranged in columns of multiple elements, the signal processing circuitry defining the individual beams by individually controlling each of the columns of the array.

Feuerstein teaches columns of multiple elements and signal processing circuitry defining the individual beams by individually controlling each of the columns of the array (see figure 2, shows multiple sets of hardware arranged in a column and individually controlling each beam, ie. Beam 1, Beam 2.....Beam 12, etc. Also see figures 1 and 3).

It would have been obvious to one of ordinary skill in the art at the time of applicant's invention to modify Gammon, such that the array is arranged in columns, to provide means for a modular design whereby individual signal paths can be added with a "column" of hardware.

As per **claims 6, 19 and 37**, Gammon teaches claim 1/16/34 **but is silent on** wherein the signal processing circuitry defines the individual beams by individually controlling each element of the array.

Feuerstein teaches individual control of element of the array (see figure 2 Channel element/Controller, #26-1, #26-2, etc. and Switch Decision Controllers, #22-1, #22-2, etc. and C7, L49-61). The examiner interprets this hardware as providing individual control since they only control one beam each.

It would have been obvious to one of ordinary skill in the art at the time of applicant's invention to modify Gammon, such that the signal processing circuitry defines the individual beams by individually controlling each element of the array, to provide means for controlling each individual beam for optimal RF transmission.

As per **claims 7, 20, 38**, Gammon teaches claim 1/16/34 **but is silent on** wherein the signal processing circuitry defines the individual beams simultaneously.

Feuerstein teaches controlling the beams simultaneously since the TCS takes the traffic channel outputs from each channel and routes them (eg. simultaneously) to the best forward path antenna beams (C7, L49-61).

It would have been obvious to one of ordinary skill in the art at the time of applicant's invention to modify Gammon, such that the signal processing circuitry defines the individual beams simultaneously, to provide a quick and efficient system that can simultaneously transmit/receive RF data from multiple users.

As per **claim 9**, Gammon teaches claim 2 **but is silent on** further comprising fiber converters coupled between the digital converter circuit and the signal processing circuitry to optically pass the signals therebetween.

The examiner takes **Official Notice** that data transmission provides higher bit rates and higher fidelity than copper landlines and would be used by one skilled to increase bandwidth while lowering bit errors when connecting the BTS back to the MSC/PSTN network (refer to Struhsaker who discloses fiber optic links).

It would have been obvious to one of ordinary skill in the art at the time of applicant's invention to modify Gammon, such that fiber converters couple between the digital converter circuit and the signal processing circuitry to optically pass the signals therebetween, to provide a high-bandwidth, low error-rate communications conveyance between various network elements of the system.

As per **claim 10**, Gammon teaches claim 1 wherein the converter circuitry divides the analog communication frequency into multiple band analog portions for conversion (see figures 17-19).

As per **claims 11 and 22**, Gammon teaches claim 2/16 **but is silent on** wherein the frequency converter circuit divides the communication frequency band into multiple bands for conversion and the digital converter circuit individually converts each of the multiple bands.

Feuerstein teaches A/D and D/A converting and intermediate frequency conversion. (C4, L30-67 teaches frequency conversion and A/D conversion). One skilled would use this same hardware to support Ke's multiple service providers.

It would have been obvious to one of ordinary skill in the art at the time of applicant's invention to modify Gammon, such that the frequency converter circuit divides the communication frequency band into multiple bands for conversion and the digital converter circuit individually converts each of the multiple bands, to provide means for performing A/D and D/A conversions for each of the bands supported.

As per **claims 12 and 39**, Gammon teaches claim 1/34 and a plurality of communications frequencies (title/abstract teaches PCS providers sharing frequencies) **but is silent on** wherein the antenna array of elements is operable to define multiple analog RF communication frequency bands and individual beams for each service provider in a corresponding band portion of the RF frequency band.

Feuerstein teaches an antenna array of elements that is operable to define multiple individual beams for signals (see figures 1-3 show multiple beams transmitted).

It would have been obvious to one of ordinary skill in the art at the time of applicant's invention to modify Gammon, such that the antenna array of elements is operable to define multiple, individual beams for signals, to provide means for the antenna to steer/control multiple beams which support RF communications to a plurality of mobile users.

As per **claim 13**, Gammon teaches claim 12 a frequency multiplexor coupled between the antenna and the converter circuitry to provide transmit and receive signals for each of the plurality of communication frequency bands for individual conversion (figure 2, #150 teaches a first/second combiner filter and summer which reads on a frequency multiplexor supporting the plurality of frequency bands).

Claims 8 and 21 rejected under 35 U.S.C. 103(a) as being unpatentable over Gammon/Feuerstein and further in view of Reudink et al. US 5,889,494 (hereafter Reudink).

As per **claims 8 and 21**, Gammon teaches claim 1/16 **but is silent on** wherein the individual beams are oriented in different directions.

While sectored antennas are well known in the art as providing individual sectors/beams being oriented in different directions, the examiner puts forth **Reudink** who teaches a sector cell shaping system that has supports beams in different directions (see figures 1a, 1b, 2 and C1, L35-67).

It would have been obvious to one of ordinary skill in the art at the time of applicant's invention to modify Gammon, such that the individual beams are oriented in different directions, to provide upwards of 360degrees of cellular coverage from each antenna BTS.

Claims 14-15, 23-24 and 40-41 rejected under 35 U.S.C. 103(a) as being unpatentable over Gammon/Feuerstein and further in view of Roberts et al. US 4,845,504 (hereafter Roberts).

As per **claims 14, 23, 40**, Gammon teaches claim 1/16/34 **but is silent on** wherein the signal processing circuitry is further operable to selectively drive the antenna to steer at least one of the defined beams.

Roberts teaches each of receive antenna towers is connected to a beam steering network (C4, L10-16).

It would have been obvious to one of ordinary skill in the art at the time of applicant's invention to modify Gammon, such that the signal processing circuitry is further operable to selectively drive the antenna to steer at least one of the defined beams, to provide means to control the antenna system to steer it for optimal RF communications with a plurality of mobile users.

As per **claims 15, 24, 41**, Gammon teaches claim 14/23/40 **but is silent on** wherein the beam is steered in at least one of azimuth and elevation.

Roberts teaches Each of the sixteen receive antenna towers is connected to a beam steering network for positioning the receive sector beams in three different azimuth positions and three different elevation positions (C4, L10-16).

It would have been obvious to one of ordinary skill in the art at the time of applicant's invention to modify Gammon, such that the beam is steered in at least one of azimuth and elevation, to provide optimal RF communications by having the ability to steer the beam to different positions.

Claim 43 rejected under 35 U.S.C. 103(a) as being unpatentable over Gammon and Feuerstein and further in view of Struhsaker et al. US 6,188,912 (hereafter Struhsaker).

As per **claim 43**, Gammon teaches claim 34 **but is silent on** the antenna array of elements is operable to define multiple individual beams in a sector for signals in a plurality of microwave backhaul frequency bands.

Struhsaker teaches a base station supporting wireless local loop (WLL) and can also be configured to support a hybrid combination of wired and wireless channels. The E1 and ADM card set could, for example, be situated at the central office and the other cards be positioned at a remote location so as to be better located for wireless coverage. The architecture of the present invention allows for the wireless side to use a long distance driver that has a concentrated remote access that can use either microwave backhaul, copper, or fiberoptic. The wireless part could then be situated for better wireless transmission. Note that the interface described here is an E1 interface, however, a OC1, OC3, or other interface may also be used (C9,L57 to C10, L7 and figure 2 shows optional Microwave Link #208-209).

It would have been obvious to one of ordinary skill in the art at the time of applicant's invention to modify Gammon, such that the antenna array of elements is operable to define multiple individual beams in a sector for signals in a plurality of microwave backhaul frequency bands, to provide means for a modular design that supports wired/wireless links from the BTS to the MSC/PSTN.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen M. D'Agosta whose telephone number is 571-272-7862. The examiner can normally be reached on M-F, 8am to 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bill Trost can be reached on 571-272-7872. The fax phone number for the organization where this application or proceeding is assigned is ***571-272-8300***.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Stephen D'Agosta
Primary Examiner
7-20-2005